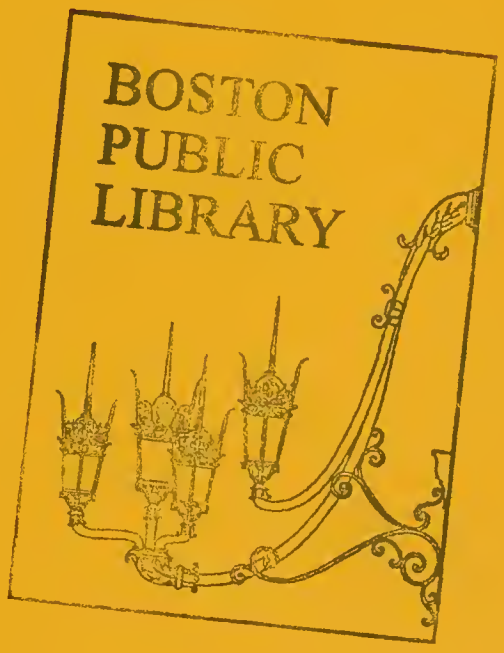
GUIDE TO THE USE OF THE

REAL ESTATE FINANCIAL ANALYSIS MODEL (REFAM)

Mark Gilman

October 30, 1972

A REPORT OF THE HOUSING TASK FORCE
RESEARCH AND PLANNING DEPARTMENTS
BOSTON REDEVELOPMENT AUTHORITY



Robert T. Kenney, Director
Boston Redevelopment Authority

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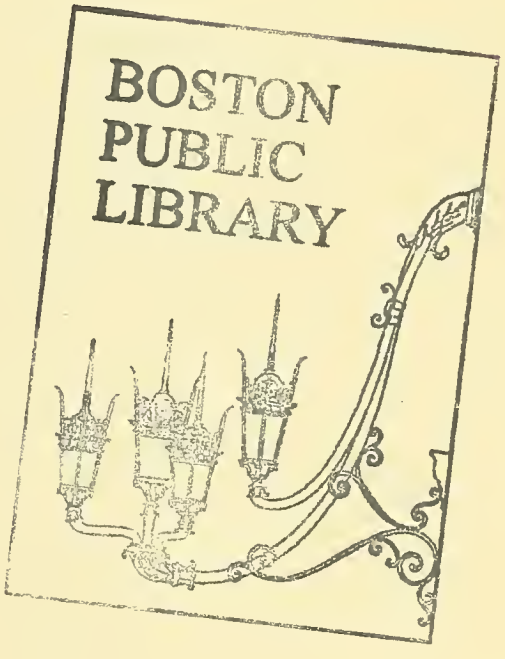

Robert T. Kenney, Director
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PREFACE

In June a Housing Task Force was established by the Planning and Research Departments of the Boston Redevelopment Authority to undertake a variety of research and program development tasks related to housing. One phase of this effort was the development of a computer model to aid in the analysis of the financial feasibility of housing and non-residential development projects. The model is now operational, and the purpose of this document is to explain the computer program and to serve as a guide to potential users.

The computer model is an attempt to "come to grips" with the various components of project feasibility such as marketable rent levels, adequate returns to the developer and sufficient initial financing. Oridinarily, the complex set of relationships and the large number of variables involved make for a tedious and time consuming series of calculations. However, with the use of the computer model, these computations, which in turn determine overall project feasibility, can be done almost instantly.

This document is intended as a guide to the use of the real estate financial analysis model (REFAM). It will consist of six basic sections. The first section will provide a brief introduction to the field of real estate economics, as well as discussing the main components of the financial analysis of a development project. It will

also focus on the types of applications where the model can be used to its greatest advantage. The second section talks about the use of the computer system and the terminal in terms of the various system commands available to the user. The third and fourth sections will deal respectively with the methods of input and the various options that can be specified. Section five describes how the model is to be used for actual analysis, and the last section provides a detailed description of the output.

Several appendices are included at the end of the guide to provide more detailed descriptions of issues mentioned in the main text, as well as a few illustrative examples. The first of these talks about several of the basic concepts of real estate economics, the second provides a complete alphabetical list of all input variables and their definitions, the third consists of three examples using the stream input, the fourth contains a sample of the interactive input as well as a sample output, and the fifth indicates some general "rules of thumb" which may be observed with regard to values for the input variables.

SECTION ONE: INTRODUCTION

A thorough understanding of the field of real estate economics is essential to a meaningful planning effort. These considerations, which are discussed in detail in Appendix 1, when intergrated with some type of market analysis, determine whether a particular project is feasible. Overall project feasibility hinges on the perspective of three sets of actors: tenants, government institutions, and developers/investors. The first of these, the prospective tenant, is primarily concerned with projected rent levels. The second actor, the set of governmental agencies involved in the project, is concerned with the costs incurred both in building the development and in keeping it operational. Lastly, there is the point of view of the developer(s) and/or any investor(s) who will build and/or own the project. They must consider both the amount of money invested to build the project (i.e. equity) as well as the yearly return on their investment.

From this it is possible to isolate the two critical components of overall project feasibility: the "front-end"[1] or development phase, and the yearly cash flow or "operational" phase. Each of these involves a large number of variables and a complex set of relationships. For

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[1] "Front-end" feasibility refers to the adequacy of the financing arrangements for getting the project built. That is to say, sufficient long-term financing must be available so as to minimize the cash equity required of the developer. If this figure represents too great an equity investment, the developer will not go into the project. Operational feasibility refers to the ability of gross rent to cover all annual operational expenses, as well as an adequate before-tax profit to the developer.

example, critical variables in the "front-end" of a project include the entire development cost structure-i.e. construction costs, architectural costs, land costs, taxes, size of the project, overhead and demolition costs, as well as the permanent and interim financing arrangements. Several of the important variables associated with the "operational" phase of the project include real estate tax rate, operating expenses, rent levels, all relevant federal tax considerations, and profit. The task of analyzing such a project would be fairly simple if these two components of feasibility were perfectly separable. However, although the variables themselves can for the most part, be identified with one or the other components, the ensuing relationships between them transcend this distinction. Thus, the analysis, if done manually, can become both complex and time consuming.

It is the purpose of the computer model that has been developed to aid in this analysis both by expediting the process, as well as providing a thorough set of data on which feasibility decisions can be based. It should be noted, however, that the model can in no way design optimal developments nor can it generate potential policy alternatives with regard to a specific project. For the model to be used most effectively, its results should be interpreted in light of a set of basic criteria regarding what constitutes reasonable cost structures, acceptable rent levels, and appropriate rates of return to the developer. Because of its ability to evaluate an entire set of alternative development proposals rapidly, the model may be most useful when a development

is no further than the conceptual stage. Alternately, though, it can be very effective in evaluating the impact of various governmental policies on the overall feasibility of a project that may be somewhat questionable without some form of outside assistance.

It is our hope that, given the detailed user's manual which is to follow, the model can become a powerful tool as well as a significant aid to anyone within the Authority requiring financial analysis of development proposals.

SECTION TWO: USE OF THE SYSTEM

The model is currently running in BASIC on the BRA's teletype terminal. The next section will deal briefly with several features of the computer system itself with which the user must be familiar.

THE BASIC SYSTEM:

The first step in accessing the system is to dial the number 489-2672 from any available telephone located close to the terminal. When a high-pitched tone is heard the receiver should be inserted into the acoustic coupler located next to the terminal. Be sure that the power switch on the coupler is in the "on" position, and that the main switch on the terminal is on "line." You are now ready to "log into the system." This is done by typing the following sequence:

HELLO-B960, BRA

The system will then respond by saying "HELLO FROM TSC." The next step is to access the model. This is done by typing:

GET-REFAM

You are now ready to formally run or execute the model, which is accomplished by typing:

RUN

The program will then begin to run by asking for input.

Note that following each command, or for that matter, any line typed by the user, the "RETURN" key should be depressed. This in effect, transmits the command (or data) to the system.

ERROR CORRECTION FACILITIES:

The only other features of the BASIC system with which the user should be familiar pertain to error correction. If a character is mistyped, it can effectively be erased by typing "←" (shift-O). Similarly, if several correction characters are in error, then an entire string may be "erased" by typing "←" repeatedly. The number of times this character is typed erases exactly that many characters backward from the point of the last non-editing character (i.e. "←") that was typed. Frequently, however, a user may find that is simpler just to retype the entire line. For this purpose, the "ESCAPE" key erases an entire line and returns the carriage.

In some cases while in the process of executing a particular run, the user may find that possibly due to a prior error, a particular run is no longer useful. In this instance, he has two options to terminate execution, depending upon the status of the run. If the terminal is printing out information, depressing the "BREAK" key will bring the run to an immediate halt. On the other hand, typing "CONTROL" and "C" simultaneously will terminate a run regardless of the current status. In order to reinitiate the run, merely type "RUN" and the system will again begin to execute the program. Halting a run in this fashion eliminates the use of the "rerun option" (see section 4) for that run.

When the user is finished using the system and desires no further runs, he merely types

BYE

and he is "logged off" the computer.

SECTION THREE: THE INPUT PROCESS

There are two basic methods of providing the model with the necessary input data. The first of these is completely interactive; that is, the input is entered via answers to a series of questions about the proposed project. As the project becomes further specified, only questions relevant to the input requirements of a particular program or project type are asked. Thus, only revelant input variables are specified. This is in contrast to the alternative input method, a "stream" of data, where all potential input variables must have designated values.

STREAM INPUT:

This input option may be elected merely by indicating an affirmative response to the first question that is asked after the "run" command is given. The model will then list a series of variables followed by a question mark. At this point, the user must provide a value for each of the variables that was previously printed. Each value must be separated by a comma with no other spacing in the line. This sequence is repeated four times, each with a different set of variables. At the conclusion of the fourth line of input, the model will begin to execute.

It should be stressed that this input option is designed primarily for experienced users. Its primary advantage over the slower, more explicit interactive routine is speed (approximately 3 times as fast). However, in that values must be input for all variables, whether or not they are relevant to the particular project and/or pro-

gram, the user must be sufficiently familiar with the model so as to realize which inputs are critical for which projects. For those variables that are not relevant for a given run they should be assigned the value of zero. A complete list of the input variables and the associated definitions can be found in Appendix II. Appendix III contains some examples of how the input stream option is to be used for several different types of projects.

If, while using the stream input, the user becomes aware of an error in the line that is currently being typed, the error correction procedures described in the previous section ("ESC" or "←") may be used. However, if the error is in a line that was previously typed, the user must terminate the run by typing "CONTROL C" and then reinitiate the model by typing RUN. Otherwise, the run must execute through to completion using the incorrect piece of input data.

INTERACTIVE INPUT:

This input method obtains the necessary input data by asking the user to answer a series of direct questions. As was stated previously, the interactive routing is much more explicit and thus is well-suited to the relatively inexperienced user. Additionally, it requires no prior knowledge of the meaning of each of the variable names as is necessary for the stream input. Speed, however, is sacrificed when the user chooses this method.

To specify this input technique, the user indicates that the "input stream" is not desired when that question appears on the teletype.

There are several technical points that should be remembered when using this method.

1. The relevant answers to each question should be typed after a '?' appears.
2. Whenever a percentage or ratio is called for, it should be entered as ".XXX....". All numbers must be input in a continuous sequence, i.e. no commas. Thus 3,500,000 would be typed in as "3500000" and not as is printed above.
3. When "zero" is an indicated option the number 'Ø' and not the letter 'O' should be typed.
4. Multiple input should be separated by a comma (not spaces).
5. The "RETURN" key should be depressed after the necessary input for each line has been provided.
6. If after depressing the 'RETURN' key, additional question marks appear, this is an indication that the input for that line was insufficient i.e. one of the questions was not answered. The additional input can be typed in provided it is the last input item for a particular question. Should this not be the case, the run must be terminated ("CONTROL C") and reinitiated by typing "RUN."

Any errors that are made while typing a given line may be corrected by using the "ESC" key and "←" as was described previously.

After all the necessary input data has been entered, the program will automatically execute. No command is required from the user. A sample of an interactive input sequence can be found in Appendix IV.

SECTION FOUR: PROJECT AND POLICY OPTIONS

The model is designed so as to be able to process the entire range of rental developments under any one of a number of federally insured or assisted programs. The specifications as to project type and any federal or state assistance are provided by the input data. Though each input variable and its associated set of options is described in Appendix II, this section will describe in a general sense all available choices of programs, policies, and projects.

PROJECT VARIABLES:

1. A project may be commerical, residential,[2] or a combination of both.
2. Development can be either new construction or rehabilitation.
3. Financing may be conventional or governmentally assisted through subsidies and/or mortgage insurance.
4. Construction costs may be input as an aggregate figure or on a per square foot basis.
5. Development expenses may be approximated from construction costs or calculated in detail.

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[2] For completely commercial projects, the financing is assumed to be conventional, and all per unit types of parameters used for residential developments will be dealt with on a per square foot basis. The option of using a combination of commercial and residential space in the same project is to be used only in connection with several HUD programs (particularly 236). In such programs a minimal amount (10-15%) of commercial space may be included in the total project costs, for the purpose of providing services to tenants of a primarily residential development. It, of course, has the additional impact of providing supplementary cash flow for the project.

6. The mortgage amount can be determined based on a per cent of replacement cost or on a per cent of the capitalized value of net income.

7. Operating expenses may be specified as an aggregate figure, a per cent of gross rent or on a per square foot or per unit basis.

8. Syndication (the process by which the rights to the tax shelter provided by the project are sold to limited partner investors) may be specified as either 15% of the mortgage or any given amount of capital that is to be contributed. The proceeds of this sale then go directly to the developer as a fee.

   Note that when using a syndication option, the user must balance the amount of capital invested to the net present value of the project's after tax returns. Specifying this amount of capital as 15% of the mortgage, is merely a starting point, and successive reruns may be necessary (using different amounts of syndication capital) to achieve the aforementioned balance.

9. Interim carrying costs can either be capitalized (included as part of the depreciable base of the project) or expensed during the development period. From the point of view of the investors or developer, it is to his advantage to make use of the tax shelter provided by interim carrying costs during the development period, due to present value arguments.

However, he can further increase his rate of return by reducing his equity investment by the amount of the tax savings generated by the expensing of these carrying expenses.

PROGRAM VARIABLES:

Any form of state and federal assistance can be specified for a particular project, given that it meets the requirements of the program.

1. Section 236[3] (or section 221 d(3) BMIR) - This program may be applied for either limited-dividend (6%) or non-profit sponsors. The user must supply the subsidized interest rate for the permanent financing and the term of the loan. However, it is assumed that the mortgage amount is 90% of certified total replacement cost which includes a 10% builder's and sponsor's profit risk allowance (BSPRA). Also a maximum before tax rate of profit of 6% is specified by the 236 program and thus need not be provided as an input variable.

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[3] Section 236 and its predecessor 221d(3) are programs for either rehabilitation or new construction of housing which involve governmental subsidies that are used to bring the market interest rate for permanent financing down to a significantly below market level (1% for 236 and 3% for 221d (3)). Additionally, a builder's and sponsors profit and risk allowance equal to 10% of the total development costs is included in the computation of total replacement cost. The explicit purpose of this term is to allow a higher percentage of actual total project cost to be covered by permenent financing which is computed as 90% of certified replacement cost (not real project cost).

2. All other federally insured loan programs 221d(3), 221d (4),[4] 220, 207[5] - For each of these programs the user must specify the means of determining mortgage amount i.e. capitalized value or as a % of total replacement cost. Additionally, the term and the interest rate for the loan must be input and should be consistent with the requirements of the program which is being applied. The model will automatically add the standard .5% mortgage insurance premium for all federally insured loans to the allowable market interest rate for the program.

3. MHFA financing - The model will not specifically request if MHFA financing is being used since the interest rates for their money varies from project to project. If MHFA is involved, it should be indicated by the appropriately reduced value of the interest rate for the permanent mortgage and/or the construction loan. It should be noted that this type of financing is available only to limited-dividend and non-profit sponsors.

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[4] The 221d(4) program, in addition to mortgage insurance allows a BSPRA in the computation of total replacement cost. The model will then assume, once this program is indicated, a mortgage amount equal to 90% of the total replacement cost.

[5] The 207 program bases the mortgage amount on 90% of the capitalized net income of the project. This information must be supplied by the user i.e., that mortgage is based on capitalized value, the appropriate capitalization rate, and the approximate rent per room.

POLICY VARIABLES:

The model is designed so as to be able to evaluate the impact and cost of any policy instruments available to governmental agencies. The two most significant tools for city government are land-writedowns and tax abatements. By employing a land-writedown it is possible to reduce the total replacement costs of the project, and thus lessen the required amount of permanent financing which in turn could lower the required rents. Similarly, a real estate tax concession (or abatement) could result in lower rents for a project, but such a policy could also be useful for generating additional cash flow which could then be used to support a higher debt service. For projects with a "development deficit," i.e. a large equity requirement due to a limit on long-term financing, an increase in the supportable debt service will justify an increase in the amount of permanent financing, and thus aid in reducing the deficit.

The primary federal policy instrument other than the various programs that have been described previously is the rent supplement program. The alternative to this on the city level would be leased housing through the BHA. For both of these alternatives, the result is lower rents paid by the tenant with the remainder of the necessary basic (or market) rent[6] being paid by the city or federal government. The model allows the

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6 Basic rent refers to the required rent level, given a subsidized rate of interest for permanent financing. Market rent on the other hand, is what the rent would be if market interest rates were applied to the mortgage loan. Leased housing, or rent supplement provisions will usually make up the difference between 25% of the tenants income and the basic rent (for subsidized projects), or market rent for non-subsidized projects.

user to specify a desired rent level, and it will calculate the necessary yearly rent supplement payments. It should be pointed out that this program can be "piggy backed" with the interest subsidy phase of section 236.

SECTION FIVE: USING THE MODEL FOR ANALYSIS

It is important that each run has a clearly defined purpose. Only then can the input parameters be properly specified so as to produce a meaningful output. Since the model is designed to be able to produce either a required rent level, or a before tax profit, the user must decide which of these variables is to be initially specified. If a required rent level is the desired output, than a rate of before tax profit must be input, or alternately, if the user wishes to know the amount of before tax profit given a set of rent levels, those levels must be input. Which of these two alternatives is chosen, depends entirely upon the perspective that the user is trying to achieve for a given run. The decision of which perspective is the proper one is based on whose point of view is being taken in the feasibility determination, that of the investor/developer or that of the future tenant. The above mentioned points are also valid when using the model to evaluate the impact of various policy instruments with respect to a reasonably structured proposal. Although, for a project to be financially feasible, it must be attractive to both the developer and the future tenants, for any given run, either a profit or a rent level must be specified. This, of course,does not say that in a subsequent run, the perspective cannot be altered. In fact, it is frequently this type of analysis, i.e. the taking of alternate points of view, that is necessary to arrive at a feasible project from both points of view.

The previous sections have described in general terms how to input the necessary data, and what options are available in terms of different types of projects and various HUD programs. Before actually using the

model it is highly recommended that the user familiarize himself throughly with the list of input variables and their definitions provided in Appendix II. It is only through such an exercise that one can achieve a fuller understanding of the structure of the model, the options available, and the various ways that it can be used as an aid in the economic analysis of development projects.

ANALYSIS USING MULTIPLE RUNS:

At the completion of the output for any given run, the model will ask if a rerun is desired. An affirmative answer will allow the user to change up to ten of the input variables from the previous run, and then rerun the model without having to repeat either of the aforementioned input routines. This procedure can be repeated indefinitely for as many runs as are needed. When no further runs are required, the user should type 'NO' after the question 'IS RERUN DESIRED' appears. The program will then print 'END' and execution has been completed. It should be pointed out that when using a series of reruns, changes in input variables will be permanent for all following runs unless the variable is specifically changed again either to a new value or back to its initial value.

It is this feature of the model that makes it extremely powerful for the analysis of development proposals that are in the conceptual stage. By using the rerun capability, a number of related alternatives within the same basic context may be rapidly analyzed. All input variables (see Appendix II) may be change using this feature and thus operating under a limited amount of uncertainty with respect to a project's cost structure

is not a significant handicap.

There are several technical points with regard to using this feature with which the user should become familiar. To change a particular variable, the user should type the variable name in double quotes followed by a comma and then its new value. For example, suppose that the construction loan interest rate (R4) is to be changed to .075. The user would type the following line:

"R4," 075

Changes should be entered one at a time, after a question mark appears on the teletype. After each change, the user must hit the return key. This procedure may be repeated a maximum of ten times (ten variables) for any given run.

After all the desired changes have been entered, ' "xx," ∅' should be typed after the next question mark to let the system know that the data set for the next run is complete. The model will then begin to execute automatically. Note that only the variables for which a new value is desired need to be entered, and that only input variables (see Appendix II) can be altered.

SECTION SIX: DESCRIPTION OF THE OUTPUT

The purpose of this section is to provide an aid for the user in interpreting the output generated by the model. The output itself is divided into four sections: equity, operating, return, and cost to government. Each of these sections will be described in detail in this part of the guide. A sample output is included in Appendix IV and it is suggested that the reader follow it closely while reading this section.

EQUITY SECTOR:

This component of the output focuses on the question of "front end" feasibility - that is, given the cost structure of the project, it addresses the issue of whether the financing arrangements are adequate from the developer's point of view to build the project. His primary concern is the real equity figure which indicates his "out of pocket costs" or his investment in the project. It is this figure which is critical in determining rate of return and thus project feasibility.

Land Costs:

This figure will represent the same acquisition cost that was previously input by the user except in the case where a land write-down is enacted by the city.

Shell Costs:

This figure will also be identical to the shell cost that was previously input. It should be non-zero only for rehabilitation.

Note that any shell cost for new construction will be included as a land or acquisition cost.

Demolition Cost:

This reflects the same figure that was input for this variable.

Direct Construction Cost:

Depending upon the option chosen by the user, this will either represent the aggregate figure previously input or the result of a calculation based on square footage and per square foot costs.

Development Costs:

This is a total figure representing total project cost with the exception of acquisition costs and any builder's and sponsors profit and risk allowance. Alternately, it could be interpreted as the sum of all direct construction costs, architectural fees, and interim carrying costs. All interim carrying expenses are internally calculated in a manner depending upon the user's specification of variable C2.

Total Replacement Cost:

This represents the sum of development costs and acquisition costs, and thus except for cases in which a builders and sponsors profit and risk allowance (BSPRA) is included in the total replacement cost, it will be the actual total project cost. A BSPRA equal to 10% of total development costs is added into the

replacement cost figure only on 221 d (3) and 236 projects for the explicit purpose of increasing the amount of permanent financing that is permitted and, as a consequence, decreasing the required "out of pocket" equity for the developer.

Real Equity:

This figure represents the difference between the total project cost and the amount of the permanent loan. Therefore, it is a critical factor in determining overall project feasibility.

Loan Amount:

This is the permissible amount of permanent financing given the type of project and the required methodology for arriving at this figure. Depending upon the type of project, this calculation will be based on capitalized value (primarily for conventional financing) or on a percentage, usually 90%, of total replacement cost (for FHA insured permanent financing). Additionally, the model will check the projected loan amount against the FHA limit (supplied by the user if less than $12,500,000), and only permit a loan up to and including that maximum figure regardless of the percentage of replacement cost.

Term Of The Loan:

This will be identical to the figure input by the user for the term of the permanent financing.

Interest Rate:

This is the market interest rate that was previously input except for FHA insured loans where it will reflect the additional .5% mortgage insurance premium.

OPERATING SECTOR:

This section of the output deals with the yearly cash flow aspects of the projected development. Its format approximates that of an income statement with revenues and expenses broken out separately. It is this section that is of primary importance in evaluating the marketing aspect of the project's feasibility if the user has specified a before tax rate of profit since the model will then calculate the requisite rent levels. On the other hand, if the user has specified a rent level, this sector provides information as to the resulting yearly before tax profit, a significant factor in determining project feasibility from the point of view of the developer/investor. While the previous section of the output focuses exclusively on initial feasibility, this section deals with continuing feasibility based on annual cash flow.

Revenues: (On A Yearly Basis)

Gross Rent: This number will either be calculated directly based on the input of a monthly rent level, or it is solved algebraically based on operating expenses, the required debt service, and a before tax rate of profit (input by the user).

Income From Commercial Space:

For residential projects that include associated commercial space, this represents the revenue derived from such space. It is based on the net square footage and the rent level, both of which are input by the user.[7]

Total Revenues:

This is the sum of gross rent and any revenue derived from the associated commercial space.

Vacancy Allowance:

This determination is made on the basis of the occupancy rate input by the user. It usually ranges from 90 to 100%.

Net Income:

This is merely the net project revenue, i.e. total revenue less allowance for vacancies.

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7 For exculsively commercial projects, all revenues are included in the gross rent figure, and thus this entry will be zero.

Expenses: (On A Yearly Basis)

Real Estate Taxes: Taxes are calculated as a percentage of gross rent. This rate is input by the user. Traditionally, for subsidized projects i.e. 236, the rate varies from 15% to 18%, whereas for conventionally financed developments it is between 22 and 25%.

Operating Expenses:

These expenses include all maintenance and repair expenses, management fees and any other costs incurred as a result of operating the project. They are either input as an aggregate figure, or calculated as a % of gross rent or on a per unit (or per square foot) basis. The user specifies which of these options is to be used.

Ground Lease:

This expense is only incurred in the case where the user specifies that the land is leased for an annual fee rather than purchased outright.

Net Income Before Debt Service:

This is the actual net income to the project which is used in calculating its capitalized value. It is obtained by subtracting real estate taxes, operating expenses, and ground lease costs from net project revenue.

Net Debt Service:

This figure is calculated by the model and is based on the amount of the permanent mortgage and either the market, or below market, or below market rate of interest whichever is applicable for the given project.

Before-Tax Profit:

In the case where an initial rent level is input this figure will be the difference between the net income before debt service and the debt service itself. If a rate of profit is specified, this number will, in addition to corresponding to the above difference, equal the rate applied to the real equity investment.

Rent Per Room Data:

This output data will only appear when the model must algebrically solve for a required level of gross rent. For subisdized projects both a subsidized rent per room and a market per room are calculated. In all other cases only a single rent per room figure will be produced, that being the market rent. Subsidized rent per room is arrived at by dividing the gross rent figure by the number of rooms (an input). The market rent per room for subsidized projects is based on a determination of the required gross rent if market interest rates were being paid on the mortgage loan rather than the subsidized rate. This "gross market rent" is then divided by the number of rooms to obtain market rent per room.

Salary Necessary To Live In A 2BR Unit:

This figure will be printed only for subsidized projects, and is calculated given the assumption that a tenant pays 25 per cent of his salary for housing. It is based on the basic (subsidized) rent level rather than the market rent level.

RETURN SECTOR:

This section of the output directly addresses the issue of feasibility from the point of view of the developer/investor. By looking both at the yearly after-tax return data as well as at the discounted measures of return (net present value and internal rate of return) one can make an accurate determination of whether the project provides sufficient returns on the investors' money, given a certain amount of risk, for them to make the necessary investment.

However, before going into great detail with regard to the actual output, it is important to briefly discuss two key concepts which are extremely useful for this analysis: discounting and syndication.

Discounting:

Discounting provides a comprehensive method of evaluating investments whose returns are spread over a number of years, rather than occurring as one lump sum. The basic assumption made when using this technique is that there are alternative investments available at some average rate of return. It is this average rate of return that is called the discount rate. Stated slightly differently, discounting is a means of dealing with the fact that returns to be received several years from now are actually worth less than their face value at this point in time. This difference in value may be looked upon as an opportunity cost of holding money in light of the fact

that satisfactory investment opportunity exists elsewhere.

The concept of net present value represents a means of obtaining a single measurement of net return at the present time, when, in fact the actual returns occur in differing amounts over a number of years. To calculate a net present value for a given stream of revenues, one merely applies the discount rate to each component of the stream, and then simply adds each of these "discounted values" together. The exact mathematical formula is:

$$NPV = \sum_{i=1}^{n} \frac{R_i}{(1+d)^i} \quad \text{where}$$

n= number of years over which returns occur.

i= any given year

d= the discount rate

R_i= the face value of the return in year i.

The concept of net present value is particularly significant in that it represents an amount of equity a rational investor would be willing to invest to obtain a given stream of revenues. Applying this to development finance, if the net present value of the after tax returns does not at least equal the amount of cash equity required to build the project, then the developer would probably be unwilling to go ahead with it.

Syndication:

The concept of syndication is based on one rather fundamental premise with respect to development projects. In that such projects represent a fairly large capital investment, they will generate a correspondingly large annual figure for the depreciation of this capital asset if it is built. This depreciation, in and of itself, is worth a significant amount of money to anyone who has an income sufficiently large to be in the 50% tax bracket or higher, as depreciation is a deductible expense according to the Internal Revenue Service. As such, it "shields" other income from potential taxation at the rate of the tax payer (e.g. 50% or higher). Notice that the rights to such a shield are not as valuable to someone whose income is taxed at a 25% rate as compared to one who is taxed at a 50 to 70% rate. It is based on the aforementioned ideas that real estate syndicates are formed.

Syndication itself, is the process by which the rights to the equity in the project i.e. the tax shield, are sold to limited partner investors for a fee. The developer, to whom the potential shelter is not as valuable as it is to investors taxed in a higher tax bracket, thus relinquishes the majority of his equity in the project for this fee. Thus, his profit becomes the difference between the "syndication proceeds" i.e. the amount investors are willing to pay for the rights to the

tax benefits, and the initial cash equity required of the developer. Notice, now, though that when we discuss rates of return, the relevant equity base for such computation is the amount of the syndication proceeds, i.e. the equity investments of the limited partners.

Now, with these two concepts in mind, we'll discuss in detail the return section of the output.

After Tax Returns:

The annual after tax returns are calculated by adding the potential tax savings (or subtracting actual tax payments) to/from the before tax profit. For a good part of the project's life, the "shield" provided by the depreciation, results in a negative taxable income. This, in turn, generates tax savings and, thus, the after-tax return is greater than the before tax profit. The reason for the gradual decrease in after tax returns is due to accelerated forms of depreciation that are used, which maximize the depreciation that is taken in the early years. This action in turn increases the net present value.

Rate of Return:

This number is calculated for each year up to and including the year in which sale occurs. It is obtained simply by dividing the annual after-tax return by the appropriate equity base for the project - either the developers cash equity or, for a syndicated project, the syndication proceeds.

Free And Clear Return:

This number is calculated by dividing net income (including debt service) by total project cost. It is primarily intended to provide a basis for comparison against the before-tax rate of return, for the purpose of analyzing the leverage of the project. Thus, it is most relevant to a non-syndicated situation, as when a project is syndicated, the developer's equity is no longer the basis for any return measures.

Consequences Of The Sale Of The Project:

This section of the output includes the year in which the project is to be sold (input by the user), the taxes that are paid on the sale, and the net proceeds to the developer/investor after taxes and the mortgage balance have been paid. The sale price is calculated by the model based on the option that is specified by the user. Based on this sale price, and the depreciable basis in the year of sale, certain portions of this gain are subject to recapture tax, capital gains tax, and a 10% minimum tax. The recapture tax and the minimum tax attempt to recapture a certain portion of the tax concessions allowed by accelerated depreciation methods and the capital gains exclusion, respectively. The figure appearing on the output for taxes on sale is the sum of all such taxes that are incurred. The proceeds from sale is then obtained by subtracting the mortgage balance and the taxes from the sale price.

Discounted Measures Of Return:

Net Present Value: As was discussed previously, this measure discounts the annual after-tax returns provided by the project at the rate specified by the user. It then sums them to obtain the net present value of the stream of revenues. All consequences relating to the sale of the project are included as an additional element of the return in the final year.

Internal Rate of Return: This provides a single rate of return measure for the entire project given the year of sale. It is that discount rate, which, when applied to the project's revenues, produces a net present value equal to the original equity investment (or the proceeds of syndication i.e. the "equity" of limited partner investors). This particular measure is extremely useful for evaluating feasibility from the developer/investor point of view, as for a rational investment this number should be greater than or equal to the investor's discount rate which is initially specified by the user. If this number is significantly below a standard discount rate (15%), all other things being equal, the developer will probably not want to involve himself in the project.

Ratio of NPV to Project Equity:

This number is obtained by dividing the net present value by the relevant equity base for the project, either the developer's cash equity or the syndication proceeds. For a rational investment, this number should be greater than or equal to one, since,

using an appropriate discount rate, the net present value should at least equal the required equity. A condition of equality implies that the internal rate of return for the investment is exactly equal to the initial discount rate. If the ratio is less than one, it gives some indication of the level of investment a developer would be willing to make given the revenues provided. For example, if the ratio is .8, one might say that a developer/ investor would be willing to invest .8 of what he was investing under the conditions that produced the .8 ratio. At this point in a case of a syndicate the user would want to rerun with a smaller input figure for the proceeds of syndication - the objective being to achieve a rate of return close to the discount rate, an indication of a rational investment.

Developer's Fee:

This will only appear in the case of syndicated projects. In other cases the developer retains rights to the cash flow generated by the project. The fee is defined as the difference between the proceeds of syndication and the developer's cash equity(which appears in the equity sector of the output). This, in effect, becomes the developer's initial profit and it is realized no later than the completion of the project.

COST TO GOVERNMENT SECTOR:

This section of the output summarizes the costs to both the city and federal governments of the various policy options that the user has specified. It is this section that would be used in evaluating and comparing the costs of alternate policy options. Again, here we make use of the concept of discounting for costs that are spread over a number

of years. However, the discount rate that is used is 6% (rather than the 15 to 20% used by investors). The reason for the difference is that the government is not motivated totally by return on investment for a given set of expenditures, but rather by concepts of social welfare. Thus, there is a certain opportunity cost attached to the holding of funds and the 6% figure attempts to represent that.

The output is separated into costs to the city government and costs to the federal government.

Cost To City Government:

Cost of land write-down: This would be a one time expense incurred by the city in order to reduce the acquisition costs to the developers. The rate for such a write-down is set by the user's input.

Cost of Tax Abatements: This reflects the total cost of tax abatements and concessions for all years up to and including the year of sale. It is based on a constant amount for each year. The yearly dollar value of the concession is calculated from the user-supplied rate of abatement.

Total Costs To The City: The model provides both an absolute total cost as well as a discounted total cost for city related expenditures. We employ the discounting

technique here since the tax abatement, though a constant amount, is a recurring annual cost over the life of the project.

Cost to the Federal Government:

This section is further broken down into three sub-sections - the cost of rent subsidies (supplements), the cost of any interest subsidies i.e. 236, and the cost in taxes foregone. The first two sections will only be printed out if rent supplements and/or interest subsidies are specified by the user. The third section will print out in all cases unless the entire cost to government routine is suppressed. No grand total cost to the federal government is computed as the above costs are both real costs (expenditures) i.e. the rent supplements and interest subsidies, as well as indirect costs (taxes foregone) which may or may not be incurred regardless of the proposed development.

Cost of Rent Subsidy:

The basic yearly cost is calculated from the desired rent per room (input by the user) and the resultant project rent. Currently it is assumed that this supplement will be extended to all rooms in the project. This constant yearly figure is then multiplied by the numbers of years until sale occurs to get an absolute total for rent supplement expenditures. Then, the constant yearly cost is discounted

at 6% to obtain the total discounted cost of rent subsidies (supplements).

Cost of Interest Subsidy:

The initial yearly subsidy figure is derived from the difference in the debt service payment at market interest rate and that at the subsidized interest rate. If these subsidies are to be phased out, they will decrease at a constant rate over the "phase-out" period (specified by the user). Otherwise, the model will assume the same annual cost of the interest subsidy payments. The annual costs are first added to obtain a total cost for the interest subsidy program, and then discounted to calculate a discounted total cost.

Cost in Taxes Foregone:

This cost is derived from the annual tax savings (or payments) made by the developer, on the basis of the annual computation of taxable income. Looked at slightly differently, it can be thought of as the difference between annual after-tax profit and before tax profit. It should be noted that this is an indirect cost i.e. not a real expenditure in the sense of a rent supplement or an interest subsidy. Additionally, it is a cost that is not completely attributable to the project since if the project

were not built, the losses in taxes foregone could just as well originate from another source. The annual cost in taxes foregone to government is then reduced by the amount of the taxes regained at sale and totaled. A discounted total is also calculated.

CONCLUSION:

This concludes the current version of the user's guide for the real estate financial analysis model. If subsequent revisions are made in the model, the documentation will be extended to cover such changes.

Following this page is a set of appendixes: These appendixes should be reviewed closely before attempting to use the model.

Any questions, on this, or on the actual working of the model should be directed to Mark Gilman or Kent Colton.

APPENDIX I

A SHORT NOTE ON THE COMPONENTS INVOLVED IN THE FINANCIAL ANALYSIS OF REAL ESTATE

Key Factors and Variables

There are a number of factors that are involved in the analysis of the feasibility of a development project. The task of identifying and explaining the various economic, social, and policy variables that exist, though, is complex. Outside of the more quantitative factors which may be somewhat easier to measure, there are numerous qualitative influences such as the type and quality of the structure that is built, neighborhood composition and amenities, political feasibility, personal preferences, design and layout characteristics, relocation provisions, community attitudes, and accessibility to various services. Any one or a combination of these qualitative variables may be the most important determinants of the success or failure of a development project. In this model, our attention is restricted to those factors that are quantifiable.

A general outline of the primary variables we have considered is as follows:

1. Acquistion Costs -- Land costs (based on location, cost of assembly, etc.), cost of any existing structures.

2. Construction Costs -- materials, labor, fees, demolition.

3. Carrying and Financing Charges -- debt service charges, interest charges on interim construction loan, interim real estate taxes and any FHA related fees.

4. Replacement Costs -- total of items 1-3: acquisition costs, construction costs, and carrying and financing charges. Long term financing arrangements and equity investment are based on total replacement cost.

5. Long Term Financing Arrangements -- size of mortgage, length, interest (and amortization) rates.

6. Equity Investment -- amount of equity invested by the developer. In federal programs, the actual investment by the builder is influenced by what is known as a builder's and sponsor's risk allowance.

7. Operating Expenses -- real estate taxes, administration, maintenance, management costs.

8. Return on Investment -- return received by developer or investors his equity investment, usually expressed as a percentage of equity.

9. Federal Taxes and Tax Incentives -- depreciation methods (straight line, declining-balance, sum-of-the-year's-digits), recapture taxes (based on excess depreciation) and minimum tax.

10. Syndication -- the process by which the rights to the project's depreciation are sold to limited partner investors.

All of these variables inter-relate to determine final rental levels and rates of return. Figure 1 expresses these relationships in flow chart form.

Explanation of the Flow Chart:

Since the rent must be greater than or equal to costs, monthly rentals are a function of a yearly payment which includes both interest and amortization, the return on investment which the developer is allowed or is attempting to receive, and operating expenses. For any given year these costs can be totaled and rents can be determined. In reality, of course, the determination of the expenses, profit, and debt portions of cost are somewhat more complex than the discussion so far may suggest.

The determination of operating expenses at a simple level is fairly straightforward. Real estate taxes are coupled with all administrative, maintenance, and management costs. It should be noted that although numerous other economic, administrative and political questions underlie the determination of the property or real estate taxes these considerations will not be dealt with in this model.

The debt and profit portions of the flow chart pictured in Figure 1 are closely related. As we have mentioned previously, total replacement costs are determined by adding costs for construction and acquisition to carrying and financing costs (primarily interest charges for interim loans for construction and acquisition). To develop a project, we would need to secure sufficient funds to cover replacement costs.

Several alternative sources are generally used to do this. The developer usually invests some of his own resources or equity into a project. He will also attempt to obtain a mortgage loan for a substantial portion of the total cost. As a final alternative, he has the option of raising capital from the proceeds of a syndication; a certain portion of which will go toward covering costs with the remainder becoming the developer's profit. The developer is usually required to "put up" about 20% of the estimated cost of development, although this figure varies depending on the particular project in question and the skills, experience,and credit rating of the developer in gathering resources. Federally sponsored projects provide for financing up to 90% of the cost, but "fudge factors," such as the builder's and sponsor's risk allowance, actually allow loans to reach as high as 97% of the cost

of projects (and some developers can even get the loan up to 100% or beyond).

The actual cost per year to borrow money will vary according to the long term financing arrangements which are established. The size of the mortgage, the length of the mortgage, the amount of equity, and the interest rate will be used to determine the constant yearly payment which will be required over the life of the mortgage.

Return on investment is usually figured as a percentage of the equity which is invested in a particular project whether it be the developer's investment or that of limited partner investors in a syndicate. This return is figured both before and after taxes. The constant cash flow or profit before tax is found by taking the difference between total rental income and total expenses, including both operating costs and debt financing costs. A developer is then allowed to subtract depreciation before determining the taxable cash flow. The amount paid on the principal of the loan or amortization is then added to taxable cash flow, taxes are determined, and the tax gain or loss is added to or subtracted from the original cash flow in order to determine return after taxes.

When examining this process, it soon becomes clear that tax shields, such as accelerated rates of depreciation, can make a great deal of difference in the profit to the developer or investors, especially to those whose large incomes put them in high income brackets.

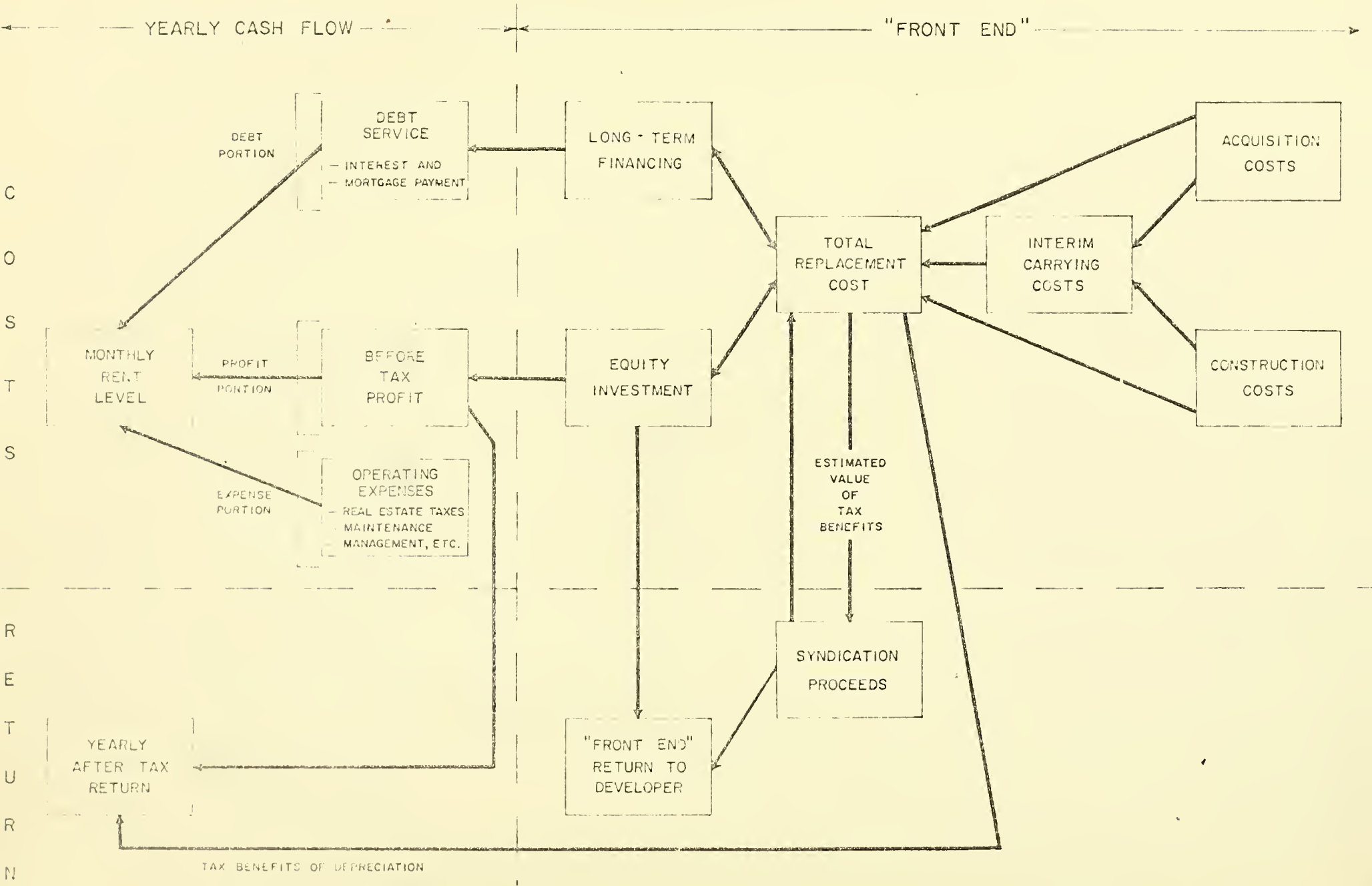
Other Qualitative Considerations:

In analyzing each of these factors and their overall relationships a number of other considerations should be mentioned. First, time is extremely critical variable all the way through the entire process. For example, a delay in development may cost a great deal of money because of continuing interest charges, increased construction costs, difficulty in obtaining financing, etc. Time during the project construction period as well as the time allowed for mortgage and depreciation is especially critical.

Second, in order to evaluate the impact of alternative subsidy forms on a project realistically, one must examine the effect of cash flows over a period of time using a discounting technique. Third, there is an important need to coordinate policies at a federal, state, and local level in order to achieve an optimum impact in manipulating and modifying these variables. If federal action reduces the interest rate but local policy raises real estate taxes, the ultimate impact on rent levels may be zero. Constraints which are passed on and exist within each level of government must be considered carefully.

These are the primary variables in determining the cost and rental level of housing. A more detailed explanation of the use of these variables in the model can be found in the main portion of the users guide.

FLOW CHART OF REAL ESTATE DEVELOPMENT



APPENDIX II

ALPHABETIZED LIST OF INPUT VARIABLES AND THEIR DEFINITIONS

B1 - Interest rate on land financing. Input as .XX

B2 - Percentage of land costs that are financed. Input as .XX

B4 - Depreciable life of the project, in years. Usually it is 40 for residential new construction and 25 for any commercial, and residential rehabilitation.

B5 - Depreciation method. Type a:

1. - Straight Line

2 - Sum of the years digits

3 - Double declining balance

4 - 150% declining balance

5 - 5 yr. write-off (Rehab. only)

B7 - Mortgage limit; 12,500,000 is the statutory limit but mortgage limits based on unit distribution can be lower than this. This limit should be calculated by the user and input if this is to be a constraint, else 12,500,000 should be entered.

B9 - Construction cost per sq. ft. of commercial space in a residential project. This variable is only use when a project includes both residential and commerical components. (See E2)

C2 - Indicator for calculation of development expenses

Type a: 1- detailed calculation of all interim carrying expenses, and archtectural fees.

2- extrapolation of total development expense from construction costs.

C5 - Proceeds of syndication to limited partner investors. Either a dollar amount can be input or typing a '2' will indicate that the capital contributions are estimated at 15% of the mortgage. See output section (return data) for further discussion on how to use this input variable.

DØ - Builder's rate of profit as a per cent of direct construction costs. Input as .XX... Enter a zero if there is identity of interest between builder and developer, as there is no separate builder who must receive a profit over and above that received by a developer. Used only if development expenses are to be calculated in detail i.e. C2 equals 1.

D1 - Construction expenses if input is an aggregate figure.

D2 - Demolition costs

D3 - Land or acquisition costs (purchase).

D4 - Value of the shell (for rehabilitation only). Shell costs for new construction should be included with land cost. For all new construction, a zero should be entered for this variable.

E2 - Construction cost per square foot for the residential portion of a residential projects, or for a totally commercial project.

E3 - Indication for calculation of construction costs.

Type a: 1 - calculate expenses from square footage. Used in with B9, E2, and E8.

2 - expenses are input as an aggregate figure.

E4 - Annual leasing cost of land (zero if land is purchased outright).

E5 - Indication for type of project.

Type a: 1 - commercial

2 - residential, or for a combination of residential and commercial space.

E6 - Total net project square footage excluding any commerical space included in a residential development. Type a zero if construction costs are input as an aggregate figure.

E7 - Yearly rent (per sq. ft.) for commercial space in a residential project. Type a zero if no commercial space is included.

E8 - Net rental commercial space (sq. ft.) in a residential project. Type a zero if no commercial space is included. For a totally commercial project, net rentable commercial space is entered as variable E6.

E9 - Indicator for land options.

Type a: 1 - leasing arrangement

2 - outright purchase used in conjunction with variables D3 and E4.

F8 - Can be either a rate of before tax profit or a monthly per room rental (depending upon indicator R1). See output section (operating sector) for further discussion of the use of this variable.

G1 - Indication for governmental cost calculations.

Type a: Ø - no print-out.

1 - print-out of costs to city and federal government.

H2 - Per cent by which land is written down by the city. Input as .XX.

H3 - Lenght of development period (in years).

H4 - Rate of any tax concession granted by the city. Input as .XX. Note that this is the rate of the concession, not the resulting rate after considering the concession.

H5 - Total number of rooms in a residential project.

J1 - Rent level per room that is desired given that rent supplements will make up the difference between project rent and this figure. Type a zero if no rent supplement funds are to be employed.

M1 - Market interest rate for permanent mortgage loan. Input as .XX.

M2 - Term of the permanent mortgage (in years).

M9 - Occupancy rate for the project. Input as .XX.

N1 - Average number of rooms per unit. Note that H5 (total rooms) ÷ N1 (rooms per unit) should equal total units.

O3 - Indicator for calculation of operating expenses.

Type a: 1 - a rate applied to gross rent.

2 - an aggregate figure is input.

3 - a per unit rate for residential or a per square foot rate for commercial.

This variable is used in conjunction with the actual figure W4.

P1 - Indicator for calculation of sale price.

Type a: 1 - remaining mortgage balance.

2 - capitalized value of net income.

3 - original total replacement cost.

R1 - Indicator for whether initial input is to be a rate of before tax profit applied to real equity or a monthly rent per room.

Type a: 1 - rent per room.

2 - rate of before tax profit.

This variable is used in conjunciton with F8.

R2 - Per cent of total replacement cost that can be obtained through permanent financing. Input as .XX. This is used only if mortgage amount is not based on capitalized value and is not assumed to be 90% by virtue of 236 or 221d (4) programs. If this is the case, then enter a zero.

R4 - Interest rate on interim construction loan. Input as .XX. Type a zero unless development expenses are to be calculated in detail, i.e. C2 equal 1.

R6 - This variable provides an initial estimate of market rent per room for the purpose of calculating the capitalized value of the project. This value is in turn used to compute the allowable amount of permanent financing. Note that if the resulting rent per room calculated by the model is significantly different from the input variable than reruns should be employed (changing R6) until a fairly close match is achieved. If the mortgage is not to be based on capitalized value, a zero should be entered for this variable.

R7 - Capitalization rate. Input as .XXXX. This is used only to calculate capitalized value for either the amount of permanent financing or the sale price (see P1).

R8 - Rate of Real Estate taxes as applied to gross rent. Input as .XX. For 236 projects this ranges from 15 to 17%. For conventional projects it is usually 22 - 25%.

S1 - Indicator for type of financing for the project.

Type a: 1 - conventional and all non-subsidized HUD programs.

2 - 236 projects with limited dividend requirements.

3 - non-profit sponsors.

S2 - Indicator for FHA mortgage insurance and 221d(4) program.

Type a: 1 - no FHA involement.

2 - FHA mortgage insurance program is used (except 221d(4) program.

3 - 221d(4) (see section on program options for the reason 221d(4) projects are treated separately.

S3 - Indicator for calculation of amount of permanent financing.

Type a: 1 - mortgage is based on capitalized value. If this alternative is chosen, then values must be specified for variables R6, R7, and W5.

2 - mortgage is calculated as a per cent total replacement cost. In this case, a value for R2 must be specified.

S4 - Indicator for the handling of interim carrying costs.

Type a: 1 - carrying costs are to be expensed i.e. the tax savings on these costs are taken during the development period as a return to the developer/ investor.

2 - carrying costs are capitalized i.e. included as a part of the depreciable base of the project with no return realized during development period.

3 - carrying costs are expensed as in (1) but the tax savings are applied toward a reduction in project equity rather than being taken as returns during the development period.

S5 - Indicator for certain cases where FHA requires a minimum equity of 3% of the mortgage amount. (FHA insured permanent financing only).

Type a: 1 - minimum of 3% equity is required.

2 - minimum equity is not required. If the project is conventionally financed, a '2' should be entered.

S6 - Subsidized interest rate for below market federal programs (usually 1% for 236). Input as .XX.

S7 - Period over which interest subsidy is to be phased out (in years). Enter a zero if it is to remain at its full value for the duration of the project. This is intended as a means to approximate the rate of increase in tenants incomes such that they are able to pay an increasing portion of the market rent.

T1 - Investors/developers discount rate i.e. a rate of return that could be achieved through alternative investments. This is then used in the calculation of net present value of the project's after tax revenues. Input as .XX.

T2 - Investors/developers tax bracket (usually 50%).

W4 - The actual rate or number used in the calculation of operating expenses. Input as .XX. (see description of 03).

W5 - Loan to value ratio used in arriving at mortgage amount from capitalized value. Input as .XX.

Y2 - Year in which project is sold (after development period).

APPENDIX III

INPUTTING INFORMATION INTO THE PROGRAM USING THE "STREAM" OPTION

This section of the appendix contains several sample projects which are set-up on an input form for use with the input stream option. Example 1 is a 236 project, example 2 is a 220 development and example 3 is a conventionally financed commercial project. These samples should be looked over carefully prior to using the stream input.

Each of the lines on the form corresponds exactly to a line of input data that will be requested. To see the reflection of the various project characteristics on the actual input data, one should note the "coordinates" which appear in front of each characteristic. The first number refers to the line number; the second, to the variable number within that line. They will specify exactly how each attribute is translated into a appropriate set of variables and values. It would probably be quite useful for a novice user to go through each example in detail so as to determine the exact meaning of each component of the data. The alphabetized list of variables should be used as an aid in this endeavor.

Variables which are irrelevant for a given run should be assigned a zero value. This has been done for each of the examples. However, for an actual run, the user must make this determination and assign the values appropriately. Also, there are several variables whose value will be constant for a given type of project or program. For each of the sample cases, such variables have been indicated by circled values.

SAMPLE 1:

(1.1) (2.1) (1.12) (4.7) (1.2) (4.4) 236 project (new construction)

(2.11) syndicated proceeds equal 15% of mortgage

(3.3) (3.4) 18,000 net SF commercial space renting at $5/SF

(1.6) (1.7) 1000 rooms, avg. of 4/unit

(1.3) 200,000 net residential square footage

(3.7) (3.8) construction costs of $24/SF for residential $20 for commercial

(4.11) real estate taxes are 15% of gross rent

(3.1) (3.2) operating expenses are 37% of gross rent

(3.11) construction loan interest rate of 7%

(4.8) market interest rate of 7%

(4.5) (4.6) double declining balance depreciation over a 40 year live

(4.13) (4.14) sale in the 20th year for mortgage balance

(4.16) 95% occupancy

(2.7) (2.6) 200,000 acquisition costs

(4.15) mortgage limit of 10,000,000

(4.9) (4.10) 50% tax bracket and 15% discount rate

(2.12) no cost to government output

(4.3) 2 year development period

(2.10) interim carrying costs are capitalized

Example 1: 236 Project

Sample Input Form For
REFAM

Line 1:

Variable name	S1	E5	E6	S5	S2	H5	M1	S3	R6	R7	W5	R2	
Value	2	2	200000	2	2	1000	4	2	Ø	Ø	Ø	Ø	

Line 2:

Variable name	R1	E8	S6	J1	S7	E9	D3	H2	E4	S4	C5	G1	
Value	2	.00	.01	Ø	Ø	2	200000	Ø	Ø	2	2	Ø	

Line 3:

Variable name	O3	W4	E7	E8	E3	D1	F2	B9	D2	C2	R4	
Value	1	.37	5	18,000	1	Ø	24	20	Ø	1	.07	

Line 4:

Variable name	B1	DØ	H3	D4	B5	B1	M2	M1	T2	T1	R8	H4	Y2	P1	B7	M9
Value	Ø	Ø	2	Ø	3	40	40	.07	.5	.15	.15	Ø	20	1	1000000	.95

SAMPLE 2:

(1.1)(1.12)(1.2)	220 project
(2.1) (2.2)	$75 rent/room
(3.5) (3.6)	construction costs at 8,000,000
(3.10)	development costs to be approximated from direct construction costs
(1.6) (1.7)	1000 rooms, 3.5 rooms/unit
(3.3) (3.4)	no commercial space
(4.11) (4.12)	real estate taxes are 23% at gross rent with a 15% abatement
(3.1) (3.2)	operating expenses are 650 per unit
(2.6)(2.7)(2.8)	land costs are 200,000 with a 10% write-down by the city
(4.7) (4.8)	mortgage term is 30 years at 7.5% interest
(4.16)	95% occupancy
(4.13) (4.14)	sale occures in year 10 for capitalized value
(2.11)	no syndication
(4.3)	2.5 year development period
(2.12)	cost to government output is desired
(4.5) (4.6)	double declining balance depreciation over 40 years
(4.15)	mortgage limit of 10,000,000
(4.9) (4.10)	50% tax bracket and 20% discount rate
(4.16)	90% occupancy rate
(2.1Ø)	interim carrying costs are expensed

Example 2: 220 Project

Sample Input Form For
REFAM

Line 1:

Variable name	S1	E5	E6	S5	S2	H5	M1	S3	R6	R7	W5	R2
Value	(1)	(2)	Ø	2	(2)	1000	3.5	2	(Ø)	(Ø)	(Ø)	(-9)

Line 2:

Variable name	R1	F8	S6	J1	S7	F9	D3	W2	E4	S4	C5	G1
Value	1	7.5	(Ø)	(Ø)	(Ø)	2	200000	.1	Ø	1	Ø	1

Line 3:

Variable name	03	W4	E7	E8	E3	D1	E2	B9	D2	C2	R4
Value	3	650	Ø	Ø	2	800000	Ø	Ø	Ø	2	Ø

Line 4:

Variable name	B1	DØ	H3	D4	B5	B1	M2	M1	T2	T1	R8	H4	Y2	P1	B7	M9
Value	Ø	Ø	2.5	Ø	3	40	30	.075	.5	.2	.23	.15	10	2	1000000	.90

SAMPLE 3:

(1.1) (1.2) (1.5)(4.15)	commercial project coventionally financed
(1.3)	300,000 net rentable square footage
(2.1) (2.2)	rent is 7.50/square foot
(3.7)	construction cost is $22/square foot
(2.6) (2.7)	acquisition costs of $75,000
(4.11)	real estate taxes are 25% of gross rent
(3.1) (3.2)	operating expenses are 100,000 annually
(4.7) (4.8) (1.9)-(1.12)	mortgage is 25 years at 8.5% and is based on capitalized value. Loan to value ratio of 85% with a 9% capitalization rate
(4.5) (4.6)	depreciation is straight line over 40 years
(4.9) (4.10)	tax bracket is 50% and discount rate is 15%
(4.13) (4.14)	sale occurs in 15th year for $10,000,000
(2.12)	no cost to government output
(4.3)	2 year development period
(2.10)	interim carrying costs are expensed with real equity reduced by tax savings
(4.16)	85% occupancy rate

Example 3: Commercial Development

Sample Input Form For
REFAM

Line 1:

Variable name	S1	E5	E6	S5	S2	H5	U1	S3	R6	R7	W5	R2	
Value	(1)	(1)	300000	(2)	(1)	Ø	Ø	1	7.50	.09	.85	Ø	

Line 2:

Variable name	R1	E8	S6	J1	S7	E9	D3	H2	E4	S4	C5	G1	
Value	1	7.50	(Ø)	(Ø)	(Ø)	2	75000	Ø	Ø	3	Ø	1	

Line 3:

Variable name	O3	W4	E7	E8	E3	D1	E2	B9	D2	C2	R4	
Value	2	100000	(Ø)	(Ø)	1	Ø	22	Ø	Ø	1	.07	

Line 4:

Variable name	B1	DØ	H3	D4	B5	B1	M2	M1	T2	T1	R8	H4	Y2	P1	B7	M9
Value	Ø	Ø	2	Ø	1	40	25	.085	.5	.15	.25	Ø	15	10000000	(Ø)	.85

APPENDIX IV

EQUITY SECTOR

LAND COSTS 1[illegible]
SOFT COSTS 3
DEMOLITION COSTS 3
DIRECT CONST. COSTS 4.457272E+06

DEVELOPERS FEE 5.744616+06
TOTAL DEV. COST 6.43[illegible]
REAL EQUITY [illegible]
LOAN AMT 5.652706E+06 TERM 40YRS INT RATE .08

OPERATING SECTOR

REVENUES
GROSS RENT 297463.
ADDITIONAL REVENUE FROM COMM. SPACE 83750.
TOTAL REVENUES 379233.

VACANCY ALLOWANCE 18911.6
NET INCOME 360322.

EXPENSES
RE TAXES 49367.7
OPERATING EXPENSES 163613.
GROUND LEASE 3

NET BEFORE DEBT SERVICE 207644.

SUBSIDIZED LEVEL OF DEBT SERVICE 172159.

BEFORE TAX PROFIT 37605.1

RENT LEVEL INFORMATION

SUBSIDIZED RENT LEVEL/MO. 61.9757
MARKET RENT LEVEL/MO. 175.336
SALARY NECESSARY TO LIVE IN A 2 BR UNIT 11899.3

RETURN SECTOR

ANNUAL RETURNS

YEAR	AFT. TAX RET.	RATE OF RET
1	3	3
2	3	3
3	203403.	.239356
4	193613.	.227157
5	182196.	.214376
6	172135.	.20331
7	163352.	.191516
8	152731.	.180362
9	143733.	.1[illegible]951
10	134755.	.158926
11	125577.	.146573
12	117396.	.136417

FREE AND CLEAR RETURN 3.591616E-02
BEFORE TAX RETURN ON SYN. CAP. 4.44444E-02

RETURN DATA RELATED TO PROJECT SALE
YEAR OF SALE AFTER DEVELOPMENT PER. 10
TAXES ON SALE 437218.
PROCEEDS FROM SALE-437218.

DISCOUNTED RETURN DATA
NET PRESENT VALUE 561373.
INT RATE OF RET ON SYN CAP 6.11446E-02
RATIO OF N-V TO CAP. CONTRIB .062863
DEVELOPERS FEE 655372.

COST TO GOVT. SECTOR

COST TO CITY GOVT.

COST OF LAND WRITE-DOWN 3[illegible]
TOTAL COST OF IMPROVEMENTS 131144.
TOTAL CITY COSTS 131144.
TOTAL DISCOUNTED CITY COSTS 96454.1

COST TO FED. GOVT.

COST OF INTEREST SUBSIDY

INITIAL YEARLY COST 3[illegible]
PHASE OUT PERIOD (YEARS) 15
TOTAL COST OF INTEREST [illegible] 4.815[illegible]
TOTAL DISCOUNTED COST OF INTEREST SUBSIDY 1.5[illegible]

COST IN TAXES FOREGONE

TOTAL COST OF [illegible] 773.[illegible]
TOTAL [illegible]
TOTAL [illegible]

```
INPUT STATE CODE(ZERO--1 FOR YES 2 FOR NO)
?1
IF 'ZERO' IS NOT A VALID STATE CODE, TYPE THE NUMERAL '0' NOT THE LETTER 'O'
WHAT TYPE OF PROJECT--1 FOR COOP, 2 FOR LTD. DIV, 3 FOR NON-PROFIT
?2
TYPE IN NUMBER OF UNITS AND AVERAGE NUMBER OF RMS/UNIT
?400,3.1
TYPE SUBSIDIZED INTEREST LEVEL
?.01
ARE RENT SUPPLEMENTS DESIRED--ZERO FOR NO,ELSE THE DESIRED RENT LEVEL
?0
IS THE INTEREST SUBSIDY TO BE PHASED OUT--ZERO FOR NO OTHERWISE
THE NUMBER OF YEARS IT WILL BE IN USE
?15
IS LAND TO BE PURCHASED OR LEASED--1 FOR LEASED, 2 FOR PURCHASED
?2
TYPE IN MARKET VALUE OF THE LAND
?150000
BY WHAT % IS LAND WRITTEN DOWN BY THE CITY
?.2
IS ANY COMMERCIAL SPACE TO BE INCLUDED IN THE PROJECT--
IF YES, TYPE THE COST/SQ. FT. AND THE NET RENTABLE SQUARE
FOOTAGE,ELSE TYPE ZEROES
?4.75,17500
ARE CONSTRUCTION EXPENSES TO BE INPUT ON A PER SQ. FT. BASIS
 OR AS AN AGGREGATE--1 FOR SQ. FT, 2 FOR AGGREGATE
?1
FOR COMMERCIAL TYPE IN CONST. COST /SQ. FT. FOR RESIDENTIAL,
TYPE IN COST PER SQ. FT. FOR RESIDENTIAL PORTION ONLY
?43
TYPE NET SQ. FOOTAGE OF RESIDENTIAL, AND CONSTR. COSTS /SQ.
FT. FOR COMM. SPACE, ZERO IF NO COMM. SPACE IS INCLUDED
?150000,21
TYPE TOTAL DEMOLITION COSTS
?0
ARE RELATED DEVELOPMENT COSTS TO BE APPROXIMATED OR SPECIFIED
1 FOR SPECIFIED, 2 FOR APPROXIMATED
?1
TYPE CONSTRUCTION LOAN INTEREST RATE
?.075
TYPE INTEREST RATE FOR LAND FINANCING AND PORTION OF LAND
COSTS TO BE FINANCED--ZEROES IF NO FINANCE CHARGES ARE INCURRED
?0,0
TYPE BUILDERS RATE OF PROFIT (OF DIR. CONST. COSTS)
?.03
HOW LONG IS DEVELOPMENT PERIOD (IN YEARS)
?2
IS THE PROJECT NEW CONST. OR REHAB--TYPE ZERO FOR NEW CONST.
OR THE VALUE OF THE SHELL FOR REHAB
?0
WHAT DEPRECIATION METHOD IS TO BE USED--1 FOR ST. LINE,2 FOR
2 FOR SUM OF THE YEARS DIGITS, 3 FOR DOUBLE DECL.,4 FOR
150% DECLINING BALANCE, OR ZERO FOR 5 YR REHAB WRITE-OFF
?3
TYPE DEPRECIABLE LIFE (YRS)
?40
TYPE THE TERM OF THE MORT, AND THE MARKET INTEREST RATE(.XX)
?40,.075
FHA MORTGAGE LIMIT ASSUMED TO BE 12500000--TYPE ZERO IF THIS
IS TRUE ELSE TYPE THE ACTUAL LIMIT
?0
 INVESTORS DISCOUNT RATE ASSUMED TO BE 15% FOR NEW CONS.
25% FOR REHAB--IF THIS IS NOT TRUE , TYPE APPROPRIATE
DISCOUNT RATE, ELSE TYPE ZERO
?0
INVESTORS TAX BRACKET ASSUMED TO BE 50%--TYPE ZERO IF THIS
IS TRUE ELSE TYPE THE APPROPRIATE TAX RATE (.XX)
?.7
TYPE RATE OF REAL ESTATE TAX AS A % OF GROSS RENT (.XX) AND
THE RATE OF ANY ABATEMENT (.XX), ZERO IF NO ABATEMENT
?.17,.2
TYPE NUMBER OF YEARS AFTER DEVELOPMENT PERIOD THAT SALE OCCURS
?10
TYPE SALE PRICE OPTION--1 FOR REMAINING MORT. BAL.,2 FOR CAP-
ITALIZED VALUE, 3 FOR TOT. REP. COST, OR ANY DESIRED PRICE
?1
ARE INTERIM CARRYING COSTS TO BE EXPENSED DURING DEV. PD.
OR CAPITALIZED AS PART OF DEVELOPMENT COSTS--1 FOR EXPEN-
SING, 2 FOR CAPITALIZATION, 3 FOR EXPENSING AND REDUCING
REAL EQUITY BY TAX LOSSES
?2
 IS A 3% MINIMUM CASH EQUITY ASSUMED FOR THE PROJECT--
1 FOR YES, 2 FOR NO
?2
ARE LIMITED PARTNER INVESTORS TO BE INVOLVED IN THE PROJECT
ZERO FOR NO, IF YES, TYPE THE AMOUNT OF CAPITAL THEY ARE
CONTRIBUTING, OR 2 FOR AN AMOUNT EQUAL TO 15% OF MORT
?2
WHAT OCCUPANCY RATE IS ASSUMED FOR THE PROJECT
?.95
IS GOVT. COST OUTPUT DESIRED--1 FOR YES ZERO FOR NO
?1
ARE OPERATING EXPENSES OTHER THAN TAXES TO BE INPUT AS
A RATE APPLIED TO PROJECT ANNUAL RENTAL VALUE (.XX) OR PER
UNIT OR PER SQ. FT. COST--1 FOR %, 2 FOR PER UNIT, 3
FOR PER UNIT OR PER SQ. FT., THEN TYPE IN THE ACTUAL FIGURE
?1,.25
```

APPENDIX V

SUGGESTED GUIDELINES FOR THE VALUES OF INPUT VARIABLES

The purpose of this section is to provide a user who is relatively inexperienced with the concepts and variables used in the model, with some estimates for several components of the required input data. It should be stressed that these numbers only represent a "point of departure," and are thus extremely general. As the user becomes more familiar with these values, it is suggested that the input data for a particular project be more directly related to the particular features of that project, rather than these generalized estimates. This is particularly true with regard to construction expenses, which, although they can be put into a range for a given type of structure, vary greatly from project to project.

The first section of this appendix will deal with variables relating to the development costs and process. This will be followed by a discussion of several of the variables relating to permanent financing. Variables involved in the computation of yearly cash flow will be taken up in the third section. The final section will discuss depreciation and discounting.

Development Variables:

The development period will generally vary from 1 to 3 years in duration. Clearly, it is the low density development having ralatively basic construction that can be built in one year, as opposed to a high density development with more complex construction that requires three years. The average moderate density residential development will

struction gene ally falls in the $25 to $30 per square foot range. These figures assume some average level of amenities. Thus, for luxury housing of any of the above types, costs will be somewhat higher.

Commercial or office space is in most cases several dollars per square foot cheaper across the board than the aforementioned types of residential constructions. However, this again applies only to some average level of amenities frequently associated with office or commercial space. In the case of luxury, high rise office space, construction costs have been known to run well above $30 per square foot.

Again, the danger of using these estimates as other than rough guidelines should be stressed. More precise figures based on actual project characteristics should be used whenever possible due to the high degree of sensitivity of construction costs to such parameters as site conditions and amenities. Such sensitivy is not even guaranteed to be confined to the previously mentioned ranges of cost, and thus for example, luxury townhouse units built on a difficult site could quite easily have a construction cost of $24 per square foot.

This figure to be used for the rate of builder's profit is generally between 3 and 5 per cent (of direct construction costs). This, however, is only applicable when the builder represents a separate interest from that of the developer, in which case he is entitled to a profit apart from that received by the developer. This profit, is

then included in the total development cost of the project. In cases where the builder and developer represent an identity of interest, there is a no profit allocated to the builder as returns are realized from the development itself.

Financing Variables:

For conventionally financed projects, the amount of permanent financing is generally based on a percent of capitalized value. This percentage usually falls in the range of 70% - 90%. In order to derive the capitalized value of a project, one needs an appropriate capitalization rate. This rate is generally in the neighborhood of 10% and will vary depending upon the risk inherent in the investment and the types of returns expected. For a more risky project, the rate can be as high as 20% since the expected rate of return must be higher to compensate for the additional risk. For low risk projects the rate may be as low as 7% or 8%.

Note that total project cost is not taken into consideration in these calculations. As a result of this, the percent of total cost covered by permanent financing can range from 60 to 110, depending upon the projected net income. The intention of such a set of calculations is to provide financing for a per cent of total project value i.e. cost, usually between 70 and 85 for conventional financing. However, the computation of capitalized value may be conveniently manipulated so as to achieve an inflated value, and thus an inflated loan amount.

For conventional projects not basing the determination on capitalized value, the loan amount generally varies fron 70 to 80% of total replacement (project) cost again varying with the risk of the project. All subsidized and most FHA insured loans are based on 90% of total replacement cost.

The term of the mortgage also varies with the type of financing that is obtained. Conventionally financed loans have a maximum term of 25 to 30 years. FHA insured loans, on the other hand generally have terms of 35 to 40 years, depending on the particular program.

Current market interest rates are in the range of 7.5% to 8.5% for conventional mortgage loans, as well as construction mortgages. Reduced interest rates may be available through MHFA financing, or through federal subsidy programs. For example, the subsidized interest rate on permanent financing for 236 projects is currently 1%.

Operating Variables:

There are four variables necessary for the computation of yearly cash flow for which the user must provide values: before tax-profit, occupancy rate, real estate taxes, and operating expenses. For other than limited dividend projects, a before tax rate of profit of 10% (on equity) provides a reasonable estimate for required return. This is based on the fact that developers generally look for an overall return of 15%, the remainder of which occurs through tax benefits. However, if the project involves a high degree of risk, the required rate of return and before

tax profit will need to be adjusted upward appropriately.

Occupancy rates are generally assumed to be between 90 and 97 per cent for any given project. Extenuating circumstances of particular projects may require either the use of a higher or lower rate.

Real estate taxes for non-subsidized projects are generally 23 to 27 per cent of yearly gross rent. For subsidized projects, the rate is reduced to 15 to 17 percent.

There are several estimates that can be used for annual operating expenses of a project. However, most of them deal with operating expenses and taxes as an aggregate and thus the actual input to the model for operating expenses must be reduced by the estimated real estate taxes. One frequently used estimate is that operating expenses plus taxes are generally 42 to 48 per cent of gross rent. For subsidized projects, due to HUD requirements the range of acceptable rates is adjusted upward to 47 to 52%. Another possible approximation is that using operating expenses as $1000 per unit. Again this figure includes taxes, and for subsidized projects, it is inflated to $1200. When trying to assess which of these approximations is better for a given project, unit types and sizes should enter into the determination. Note that operating expenses computed on a per unit basis, will not reflect either the types or sizes of units within the project. Percentages of gross rent, however, in that rent is based on some degree on size and type of unit, will be more sensitive to changes in these parameters. Thus, for projects with other than an "average" distribution of units

and their respective sizes, percent of gross rent is probably a better estimate. For all other cases, a per unit or dollar figure for operating expenses may be perfectly adequate.

Other Variables:

Depreciation: For most residential projects, accelerated methods of depreciation (double declining balance, sum of the years digits) are permitted by the IRS. For rehabilitation projects, in particular, a special form of accelerated depreciation is permitted-namely a five year write-off of all expenses up to a limit of $15,000 per unit. These methods are in contrast with commercial and office space where only straight line methods are allowed. Note that a developer will choose the most accelerated form of depreciation available to him so as to maximize his cash flow in the early years of a project's life.

The depreciable life for most residential new construction is 40 years. This is in contrast with a life of 25 years for rehabilitation projects and all office and commercial space.

Discount Rates:

For any discounted cash flow analysis of a development project, the discount rate is a critical variable. As was discussed in the main text, it represents the desired rate of return from a developers point of view. In the case of new construction, the generally accepted rate is 15%. Rehabilitation efforts, representing riskier investments, will usually require 25%. In that the discount rate should reflect the